

MAY 25 2004

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE 24.May.04	3. REPORT TYPE AND DATES COVERED MAJOR REPORT		
4. TITLE AND SUBTITLE WOMEN IN WAR: OPERATIONAL ISSUES		5. FUNDING NUMBERS		
6. AUTHOR(S) CAPT CHRISTOPHER LESLIE A				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) UNIVERSITY OF WASHINGTON		8. PERFORMING ORGANIZATION REPORT NUMBER CI04-351		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) THE DEPARTMENT OF THE AIR FORCE AFIT/CIA, BLDG 125 2950 P STREET WPAFB OH 45433		10. SPONSORING/MONITORING AGENCY REPORT NUMBER		
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION AVAILABILITY STATEMENT Unlimited distribution In Accordance With AFI 35-205/AFIT Sup 1		12b. DISTRIBUTION CODE		
13. ABSTRACT (Maximum 200 words)				
<p>DISTRIBUTION STATEMENT A Approved for Public Release Distribution Unlimited</p> <p style="text-align: right;">20040601 033</p>				
14. SUBJECT TERMS		15. NUMBER OF PAGES 24		
		16. PRICE CODE		
17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT	

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The United States Armed Forces is an all volunteer force comprised of male and female troops with women accounting for 20% of force strength. Military personnel face unique challenges such as war, deployment and field training and two issues that affect military women – menstruation and pregnancy – have an impact on these duties.

This article discusses menstruation, the myth of a “period” and the use of continuous oral contraceptives for period suppression. Also discussed is unintended pregnancy during deployment or war that has a significant impact on military operations. In addition to period suppression, the use of oral contraceptives provides pregnancy prevention, thus increasing morale and saving money. The many established health benefits of hormone use as well as potential risks are also presented. For women who cannot tolerate the use of estrogen, Depo-Provera is examined especially as it relates to the special needs of military women. The Mirena, an intrauterine device, is explored as a possibility of period suppression as well as having a function in the unique situation of enemy capture and prisoner of war.

Finally, this article suggests implementation of an Air Force wide Commander's Policy that addresses these issues from entry to exit in a military woman's career. The money, time and effort to implement such a policy would support and benefit all female military troops personally and support successful mission accomplishment globally.

(Synopsis)

**Women in War:
Operational Issues**

By

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27 May 2004

Introduction

The Armed Forces of the United States no longer consist of an all-male force; women are now integral members of the all-volunteer military services. Military women seek equitable treatment even while realizing men and women are not the same, they have differences. Female and male troops have different physical concerns. Operational issues such as deployment and field training impact military women as regards menstruation and pregnancy in a way that does not exist for men or in a civilian setting. Military women desire and are receptive to methods of period suppression especially during times of deployment and field training, yet they remain uninformed of available methods and without access to materials to make that happen (Powell-Dunford, et al, 2003). The purpose of this paper is the discussion of pregnancy and menstruation, two operational issues that affect military women in the field. Also discussed are strategies to address these issues such as the use of continuous oral contraceptives and options for women who cannot tolerate the use of estrogen.

We already have at hand reliable and reasonable means to support period suppression, prevent pregnancy, and provide short and long term health benefits to women. We now need to implement a program that will make the information and materials easily available to all women of the military. With the high ops tempo we currently maintain and that is projected to continue unabated, we cannot afford to lose or be limited in our use of personnel due to physical issues that could be easily, and economically, addressed.

Women are often hesitant to present concerns that are specifically female due to a fear it will support the proposal that women should not be in the military (Wardell & Czerwinski, 2001). Ritchie (2001) also echoed that military women felt it was counterproductive to focus on

potential difficulties of women in the field because it may lead to the belief that women should be excluded from military service.

Meeting the specific health needs of female troops women will not weaken our military, but rather strengthen an irreplaceable resource (Wardell & Czerwinski, 2001). Bringing these issues to light should not be an excuse to bar women from serving in the military, but a means to enhance a critical manning asset. Women are proud to serve in the military and they are a valuable part of mission accomplishment.

Women in Military Service

Throughout American history, women have made significant contributions to the operations of war and in support of our Armed Forces. Women have served as combatants and as noncombatants. From the American Revolution to Operation Iraqi Freedom, women have operated as spies, cooks, secretaries, drivers, and nurses, just to name a few. Today's modern women serve in expanded roles in maintenance crews, armored divisions and as pilots. In the Civil War, women had to disguise themselves as men to fight as combatants; in recent military operations women fought side-by-side with men. Over 95% of all jobs in the military are now open to women and the percentage of women serving on active duty has more than doubled since 1978, making up 20% of the force by the year 2000 (Wardell & Czerwinski, 2001). Each branch of the United States military depends on an all-volunteer force and women are an integral component of force strength.

In the past, warfare had a well delineated "front" line that was typically manned by all male troops. Today, in the fluidity of modern warfare, the battle line is rapidly movable and attacks can occur to the front line as well as to the "rear." Infantry units at the front may still be mostly male troops, but as was evidenced in the most recent conflict in Iraq, the support units –

cooks and maintenance crews – located at the rear, were the ones who came under attack and capture.

Military Readiness and Deployment

Military readiness is a uniquely, demanding challenge for personnel of the Armed Forces that is not replicated in the civilian sector. Military readiness affects every level of operations, cadets at universities in field exercises, troops at boot camps entering military service, and personnel stationed at military bases throughout the world.

Schneider, et al. (1999) wrote about the challenges facing female cadets at West Point as regards menstrual function. The cadets expressed concern that menstruation and the need for menstrual materials interfered with their activities. Although it was reported that changes were made to address the need for menstruation materials and adequate disposal, period suppression would virtually eliminate this concern as well as the possibility of menstruation interfering with activities.

A qualitative study by Wardell and Czerwinski (2001) suggested that a portion of women deployed during Desert Storm found the management of menses difficult while they carried out their daily duties. These difficulties included obtaining menstrual supplies and managing consequences of menstruation. Some women did not want to stop to attend to menstrual needs as they felt it would tear down team effort. Women expected and wanted to do equal work, but often found it difficult during menses without more frequent breaks. One woman reported that if she had been in combat with her present menstrual cycles, she would have been unable to cope which brings up an important point. Even if a woman's menses does not pose any problems during one deployment, years later her menses may be of an entirely different nature. Studies by

Hanna (1992), Ritchie (2001), and Markenson and Raez (1992) also reflect similar findings for women during deployment.

Personnel stationed at combat bases may experience a high exercise tempo, exercising every few months with increased frequency prior to an inspection. In this case, troops are not technically deployed, but nonetheless face a heightened field exercise tempo. This can involve the wear of chemical warfare protective gear called Mission Oriented Protective Posture (MOPP) gear. MOPP 4 entails the wear of all equipment, including a flak vest weighing approximately 20 pounds and a gas mask, for up to eight hours at a time. Dealing with daily bodily functions while in MOPP 4 can be challenge enough without the added difficulty of changing menstrual materials. This challenge is only exacerbated while in real world scenarios.

The Menstrual Cycle

When a woman is not pregnant or breastfeeding, her natural hormonal cycle produces a monthly period. Historically, women had perhaps 50 periods in a lifetime as compared to women of today who can have as many as 450 periods in a lifetime (Miller & Notter, 2001). Why the difference? Years ago, women became pregnant at a much earlier age and, without benefit of effective contraceptive measures, had numerous pregnancies. It was not uncommon to have 10 to 13 pregnancies in a lifetime with only three of the offspring surviving to adulthood. During those pregnancies, a woman would be period-free. Assuming she breastfed even for only a year per pregnancy (and many breastfed for longer), with 13 pregnancies, she would be period-free for approximately 26 years of her life. In the 1800s, when a life expectancy was 38 years, a woman had very few periods. Even in 1900, when an average life expectancy increased to 45-48 years, the number of periods in a lifetime was small. The induction of amenorrhea with the use of hormonal contraception essentially mimics a similar process.

Without an understanding of our past, women may be fearful of not having a monthly period. Many women think their period is a healthy way to “cleanse” the uterus and are concerned there will be a build up of tissue and blood without it. They have been told it is “bad” if they do not have periods. Women are not entirely wrong in their thinking. It is true that if a woman has secondary amenorrhea or irregular periods and is not taking hormonal contraception, she should be seen by her provider due to concerns of the consequences of unopposed estrogen and the resulting risk of endometrial hyperplasia and cancer. However, having “periods” is not the same when using OCs.

The Myth of a “Period”

When a woman is using hormonal contraception, the monthly “period” is not a true build up of the endometrial lining with its subsequent shedding secondary to ovulation. Under the influence of hormonal contraceptives, women do not ovulate and thus the lining of the uterus does not build up. There is no need to shed this thin lining monthly. When women stop their pills for one week, instead of a “period,” they actually experience a “withdrawal bleed” which is a reaction to not taking the hormones. Essentially, this withdrawal bleed, or false period, mimics the regular menstrual cycle. Oral contraceptives were designed this way when they were first introduced in the 1960s so as to be more acceptable to the general public as well as to religious institutions that might oppose them (Miller & Hughes, 2003).

Period Suppression

As far back as 27 years ago, in 1977, Loudon established that a withdrawal bleed every three months was acceptable and effective, but it was not adopted in the community at large (Miller & Hughes, 2003; Loudon, 1977). There is no known medical benefit to monthly withdrawal bleeds, yet women continue to be prescribed the standard OC regimen (Kaunitz,

2000). Nonetheless, an off-label use of OCs for period suppression has been used for many years to address medical problems that worsen with menstruation such as endometriosis and menstrual migraines. Savvy users of OCs have known they could postpone a withdrawal bleed when needed to accommodate dates such as weddings, honeymoons and vacations.

More recently, period suppression has been embraced by the majority of health care providers. Seasonale, a monophasic combination of estrogen and progestin contraceptive pill, was approved by the Food and Drug Administration in September of 2003. It is the first dedicated OC created to reduce the number of menstrual cycles yearly and is taken continuously for 84 days followed by seven placebo days. Seasonale is designed to suppress periods so that a woman has a withdrawal bleed only four times a year.

A recent study of United States Army women showed they are receptive to period suppression and had a strong desire for amenorrhea in the field setting, yet the practice of using continuous OCs to do so had not been considered by most (Powell-Dunford, et al, 2003). This supports the need for education and information for military women.

In recent years, the patch (Ortho-Evra) and the ring (NuvaRing) were introduced on the market, both methods of birth control that combine estrogen and progestin. These newer methods could potentially be used for period suppression, however, no studies are published at present to support this. Further studies are still needed to determine what combination, route and dosage of hormones will most successfully suppress periods. These questions are as of yet unanswered.

OCs – Pregnancy Prevention, Period Suppression and Health Benefits

Despite a wide variety of contraception options, unintended pregnancies still account for half of all pregnancies in the United States. The unintended pregnancy rate was highest among

women ages 18-24, unmarried, low-income, black or Hispanic (Henshaw, 1998). In the military, unintended pregnancy mirrors the civilian statistics as it is associated with lower rank, younger age, single marital status, lower income, and lower education level (Hughes & Staren-Doby, 2003; Clark & Holt, 1998). Battista and Creedon (1999) reported that 25% of all unintended pregnancies among Army soldiers occurred in women with less than one year on active duty (unpublished data from the Army Pregnancy Study, 1992-1996). The soldiers self-reported an inability to obtain OCs secondary to limited access to care where they were told a Papanicolaou exam was required and no appointment was available.

Pregnancy that occurs during deployment or war can have serious repercussions on morale and readiness. The estimated cost to evacuate a pregnant woman out of theater is \$10,000. It was the most common reason for women to be evacuated from theater in the Persian Gulf War (Ritchie, 2001). Pregnancy was also the single largest reason for evacuation of female soldiers out of theater during Operation Desert Storm (Hanna, 1992). While it is acknowledged General Order states clearly that sexual contact is prohibited, the figures of sexually transmitted infections as well as pregnancy rates indicate human nature may have difficulty complying. It must also be acknowledged that it took "two to tango" for a military woman to become pregnant, however, she alone bears the burden of the pregnancy. Adequate prevention of pregnancy increases morale, saves money and promotes mission accomplishment.

Aside from the obvious benefits of suppressing periods and preventing unwanted pregnancies, an abundance of studies demonstrate important noncontraceptive health benefits conferred by oral contraceptives (OCs). Educating military women about the benefits of OCs will allow them to take advantage of the positive health effects (Jensen & Speroff, 2000). The

health benefits derived from OC use can also include an improved health status later in life (Burkman, et al, 2001).

One of the best established and consistently demonstrated major benefit of OCs is a reduction in the risk of ovarian cancer (Williams, 2002). Epidemiological studies confirmed that combined OCs provide substantial protection against endometrial and ovarian cancers and suggest that the protection is long-lasting, persisting for 15 years or more after stopping OC use (La Vecchia, et al, 1996). These results were independent of estrogen and progestogen doses and the formulations used (Williams, 2002). It is suggested that progesterone is the protective mechanism that counteracts the endometrial proliferative effect of unopposed estrogens and reduces estrogen-associated endometrial hyperplasia (Cancer and Steroid Hormone Study, 1987).

The risk of ovarian cancer in women who had ever used OCs was 40% less than those who had never used OCs. This risk was further reduced in women who reported longer use and the greatest reduction in risk of disease (80%) was seen in women using OCs for 10 or more years. Reduction in risk was not related to specific OC formulations (Williams, 2002).

There is also evidence suggesting that the use of OCs lowers the risk of colon and rectal cancer. A meta-analysis found a greater than 50% reduction in this cancer in women who were current users and an 18% reduction in ever-users of OC (Fernandez, et al, 1998). This protection may arise from the estrogenic component of OCs, because estrogen therapy in menopausal women seems to provide duration-of-use-related protection against colon cancer and its mortality (Williams, 2002). Hormonally induced changes in the composition of bile may be mediated by estrogen or through a direct effect of estrogen on gastrointestinal mucosa cell growth (Lointier, et al, 1992).

Another well-established benefit of OC use is a reduction in the incidence of hospitalization of women for pelvic inflammatory disease. The protective effect was primarily evident in current users who had 12 months or more of OC use even after adjustments were made for medical history, sexual history and activity, and availability and use of health care (Williams, 2002). The preventive mechanisms at work include thickening of cervical mucus causing a barrier to infectious organisms, reduced menstrual flow providing less favorable conditions for bacterial growth, and decreased retrograde menstruation (Williams, 2002).

Epidemiologic studies have consistently demonstrated protective effects of OCs against benign breast disease, including chronic cystic disease, fibroadenoma, and breast lumps (Williams, 2002). This is further enhanced with continuous OC use.

One reason OCs are often a contraceptive method of choice is their direct effect on the menstrual cycle (Williams, 2002). Dysmenorrhea is believed to result from a combination of factors, including hyperactivity of the myometrium and uterine ischemia, prostaglandin synthesis and release, pituitary hormones, cervical factors, and uterine neuronal activity (Williams, 2002). Since circulating levels of estrogen and progesterone as well as ovulation contribute to dysmenorrhea, OC-induced anovulation is an excellent option for reducing dysmenorrhea. Several controlled studies have evidenced the benefits of OCs for relief of dysmenorrhea (Larsson, et al, 1992).

A reduction or elimination of iron-deficiency anemia through the reduction of menorrhagia is another added benefit of OC use. The use of OCs directly decreases menstrual blood loss and duration of flow, thus greatly reducing the potential of iron-deficiency anemia. After 3 to 6 months of use, OCs may also be beneficial in increasing ferritin iron stores secondary to reduced blood loss (Larsson, et al, 1992). While menorrhagia is not usually a fatal

condition, nonetheless it has a substantial impact on quality of life. It also causes fatigue, significant discomfort, loss of work time, and social embarrassment, all of which contribute to great difficulty functioning in a deployment or war scenario (Côté, et al, 2002)..

Cycle related symptoms, including functional ovarian cysts, chronic pelvic pain from endometriosis and ovulation (mid-cycle) pain generally improve with the use of OCs (Jensen & Speroff, 2000). When OC formulations contained high-dose estrogen 28 years ago, it was apparent that the beneficial effect of OCs on ovarian cysts resulted in a significant reduction of surgery to treat functional ovarian cysts. In the United Kingdom, there was a 50% reduction in functional cysts in women using OCs and the risk reduction for corpus luteum cysts was even greater at 78% (Vessey, et al, 1987). With today's lower dose OCs, some debate exists as to whether the same benefit of a decreased risk of ovarian cysts still exists (Williams, 2002). A recent study by Christensen and colleagues (2002) found that low-dose monophasic OCs seemed to have a protective effect against the development of functional ovarian cysts, independent of the type of progestin and dose of ethinyl estradiol used.

OCs prevent ovulation and conception effectively and thus, are one of the best single means of preventing life-threatening ectopic pregnancy. Among women who use no contraception, Franks and colleagues (1990) found the rate of ectopic pregnancy to be 2.6 per 1000 women years, a 500-fold difference in the ectopic pregnancy incidence of 0.005 per 1000 women years among women who use OCs (Burkman, 2001).

Finally, the use of OCs also improves acne vulgaris, a major health concern affecting approximately 27% of reproductive-age women (Burkman, 2001). In Redmond's (1997) study that looked at women ages 15 through 49, the evidenced showed that OCs containing a low

androgenic (norgestimate) or antiandrogenic (drospirenone) progestin had beneficial effects and was an effective treatment for women with acne.

Risks Associated with OCs

Oral contraceptives of the 1970s contained high doses of estrogen (50 mcg to 150 mcg of ethinyl estradiol) that conferred an increased risk of cardiovascular disease (Inman, et al, 1970). These risks also contributed to the practice of limiting the use of OCs in women over the age of 35. This attitude was held until 1991 when the FDA re-evaluated the evidence in light of today's lower dose OCs (Williams, 2002).

Present day OCs, with reduced estrogen and progestin dosages, have significantly decreased the incidence of cardiovascular complications. The results from the FDA re-evaluation showed that an increased risk is now only associated with women who smoke heavily (>15 cigarettes per day). The age of the nonsmoking user of low dose OCs is not related to cardiovascular risk (Rosenberg, et al, 2001). A study by the World Health Organization (WHO) (1995) showed that even venous thrombotic events, the one remaining excess cardiovascular risk of today's estrogen-containing OCs, is not related to age of the woman and does not increase the risk beyond that of age alone. Our military services have an older population than in previous history, with approximately 30% of personnel greater than 39 years of age. Nonsmoking, normotensive women can benefit from period suppression and the use of low dose OCs until menopause.

Although OCs have far fewer risks with the introduction of low-dose varieties, no medication is entirely without risks. In 1998, the World Health Organization, after reviewing the evidence regarding the use of hormonal contraception and risks of venous thromboembolism, myocardial infarction and stroke, reported their findings as follows.

If a woman has no history of developing blood clots in her veins, her risk of blood clots with the use of OCs is very small. There is a 3 to 4 fold increased risk of venous thromboembolism with OC use which translates to an increase from 1 in 10,000 to 2 in 10,000; however, the absolute risk is half that associated with pregnancy (5.9 in 10,000) (Burkman, 2001; WHO Scientific Group, 1998).

Smoking remains the most important risk factor for myocardial infarction in women aged 18 to 49. It would appear that current use of low-dose OCs in the United States is not related to an increased risk of acute myocardial infarction among nonsmokers and light smokers. However, the risk for OC users who are both older (> 35 years) and heavy smokers may be significantly increased (WHO Collaborative Study, 1997).

The risk for stroke among nonsmokers who use OCs is negligible. Any possible risk can be reduced if users are younger than 35 years and do not have a history of hypertension. The risk for hemorrhagic stroke attributable to OC use was not increased in younger women and is only slightly increased in older women (WHO Collaborative Study, 1996).

For Women Who Cannot Use OCs

Some women should not use hormone therapy that contains estrogen. This includes women with a history of blood clots in the legs, breast cancer within the last five years, severe liver disease and those women who are older than 35 years of age and smoke heavily. In these cases, the levonorgestrel intrauterine system (Mirena) is an option. An intrauterine device (IUD), the Mirena provides contraception and releases progesterone to the lining of the uterus. It works by decreasing or halting the build-up of the uterine lining every month so that the egg is never fertilized or implanted. There is little or no endometrial lining to shed in menstruation. The Mirena is approved for five years of continuous use. This method provides an advantage for

the military woman. The IUD, once placed, requires no daily, weekly or even monthly remembering to take a pill or change a device. This can be helpful during deployment when traveling through several time zones as well as shift work that rotates through days, evenings and nights. Issues such as adequate supplies and storage of the Mirena are nonexistent since the device remains inside the uterus for five years.

A woman using the Mirena IUD also will notice changes to her menstrual period. During the first three to six months, she will have frequent spotting, light or even increased bleeding. Her monthly period may become irregular and some women may have heavy or prolonged bleeding. For a certain percentage of women, the bleeding days decrease and periods cease completely. Thus, the Mirena could also be considered a form of period suppression, with the caveat that it will only work in a certain percentage of women. For women who cannot tolerate the use of estrogen, it may be trialed for period suppression.

Enemy Capture – Prisoner of War

One added advantage to the Mirena is the pregnancy protection it provides under the circumstance of capture by the enemy. Other methods previously discussed provide period suppression and pregnancy protection as long as a woman continues to use them without interruption, but under captivity, she would no longer have access to her supplies. Pregnancy is a real threat for captured military women. While the attitude is correctly held that all torture is torture regardless of its form, and men as well as women can be raped, it is only women who carry the extra burden of the possibility of pregnancy. If she were to remain in captivity for even up to a year, she could possibly conceive and deliver in the hands of the enemy. The Mirena would prevent against pregnancy for up to five years.

Another creative option would be to place the Mirena and simultaneously take a low dose OC continuously. Since the progestin of the Mirena only works locally on the uterine lining, and is not absorbed systemically, this would not be an overdose of hormones. In fact, this combination is sometimes recommended to a patient starting a Mirena to help her through the first six months of irregular bleeding from the IUD. If a military woman considered herself at high risk of capture, and she was in the group of women whose periods were not suppressed with the Mirena, she could combine hormonal contraception with the Mirena for period suppression. If she were to be captured, she might lose the advantages of period suppression, but would maintain the protection against pregnancy.

Depo-Provera – Not a Great Choice for Military Women

Depot medroxyprogesterone acetate (DMPA; Depo-Provera) is a progesterone only hormonal contraception administered by injection every three months and, as a contraceptive, is highly efficacious. It is considered another option for those women unable to tolerate estrogen or who are breastfeeding. However, a number of clinical issues related to DMPA complicate its use with a population of military women. The common side effects are weight gain, bloating, headache, acne, depression, and a delayed return to fertility. Of greater concern to many women is the irregular and random bleeding. Also of concern for women is the evidence that users of DMPA experience a decrease in bone mineral density (BMD) (Berenson, et al, 2001; Ott, et al, 2001).

Weight gain is a very important clinical issue related to the use of DMPA, although little controlled information is available (Cromer, 1999). A commonly reported reason for discontinuation of DMPA was weight gain and there was evidence of further increases in body mass index for up to 6 months afterwards (Cromer, 1999). The average weight gain after one

year of use was 5.4 pounds from an initial body weight of 136 pounds (Depo-Provera web site). In a military environment, strict weight standards must be met and for some women even a moderate weight gain of five or ten pounds could put their careers in jeopardy. When a military member does not meet weight standards, despite reasonable interventions, she can encounter administrative actions, including written reprimands, promotion denial and involuntary separation (Robbins, 2002).

Data to date suggest that DMPA has deleterious effects on bone, especially at the lumbar spine and with long-term use in young women. A number of studies demonstrate that DMPA is associated with a decrease in BMD. Cundy, et al (2003) proposed that decreased BMD is caused by the estrogen deficiency induced by DMPA through indirect inhibition of ovarian function. The effect of DMPA on BMD appears to be greater in adolescents than in older women. Evidence indicates that the bone loss is reversible after one year, however, the time women are using DMPA, ages 18 to 30 years, is exactly a time when they should make a conscious effort to build bone mass for their later years.

The use of DMPA and its decreased BMD creates a greater problem for military women who are at increased risk of stress fractures, possibly associated with fewer menstrual periods due to physical activity and stress (Winfield & Moore, 1997). In military basic training, 10-12% of women suffered stress fractures, while the incidence among men was only 1-3% with all participating in the same training (Friedl & Nuovo, 1992).

Cundy, et al, (1998) found that the bone density deficit in the DMPA group could be translated into an increased lifetime risk for fracture of 40-50%. While the exact reason for a higher incidence of stress fractures among military women is not entirely clear (Winfield & Moore, 1997), one could conclude this risk should not be potentiated by a medically induced

declining bone mass density. This decreased BMD is also mimicked among women who suffer from the syndrome known as the female athlete triad, comprised of disordered eating, amenorrhea and osteoporosis. In this situation, athletic women involved in activities such as long distance running, gymnastics or other high level physical demands, experience a decrease in body mass index with resultant amenorrhea. A significant concern for these women is also a decrease in BMD secondary to the decrease in endogenous estrogen. There are a small number of studies showing that athletes with a history of OC use may have a decreased risk of stress fracture (Hobart & Smucker, 2000).

In clinical practice, depression is still considered a side effect of DMPA, yet we have a dearth of studies evidencing this. In the 1970s, some clinical trials of DMPA suggested negative mood changes in a percentage of women, however concerns have been raised regarding design flaws of those studies. There is now a growing body of literature that has yet to find an impact of DMPA on mood (Cromer, 1999).

Once DMPA is discontinued, there is a delayed return of fertility of approximately 6 to 12 months (Hatcher, et al, 1998). This is unique to DMPA and not replicated with the other forms of contraception. This can cause significant problems for the military woman who desires to carefully plan her pregnancies. A military woman may space her childbearing between vulnerable deployment timings or secondary to an assignment where she is at low risk for being deployed. In these cases, a more rapidly reversible form of contraception would better serve her.

When DMPA is used for 9-12 months and administered in a timely fashion (every three months), more than half of women will experience a significant decrease in the amount and duration of menses. Therefore, for these women, it can also be considered an option for period suppression. While DMPA may be the right choice for women who are unable to tolerate

estrogen or who choose not to take estrogen while breastfeeding, it is not necessarily the ideal choice to meet specialized needs of military women.

Implementation of Commander's Policy

The use of continuous hormonal contraceptives for period suppression as well as the prevention of pregnancy should be made available to all women upon entering military service and throughout their military careers. Classes that outline all available options for period suppression and contraception should be presented on a regular, on-going basis. This will allow military women to be well-informed of the risks and benefits of all methods of contraception and to remain up-to-date as progress, relevant studies and changes take place. Education regarding the short and long term health benefits, as well as the risks, of hormonal contraceptives should be elucidated. Access to information and care should begin upon entry into the military, to include female cadets at the university level. An important aspect of this policy will be the acknowledgement that a decision to use contraception or period suppression is always a woman's personal choice and not a requirement of military service.

Proactive, advanced planning is needed for military women to effectively initiate and maintain period suppression. During the Persian Gulf conflict, women reported they were told to stop taking OCs as they would not be needed or would not be available (Hanna, 1992). Hines (1992) also recounted that many discontinued use of their OCs upon deployment resulting in an increased complaint of abnormal bleeding. These women may have correctly assumed they did not need contraception while deployed, but did not realize the many non-contraceptive benefits of continuing OCs while deployed.

Giving women OCs, DMPA or the Mirena IUD a week prior to deployment has a high potential for failure and dissatisfaction. Most methods have side effects that disappear over time

and other methods need time to ascertain effectiveness. OCs should be trialed ideally for three months, DMPA can require 9-12 months for cessation of menses and the Mirena can require up to one year for desired results.

A dedicated allocation of resources, education, and time to accomplish this task would require the support of senior leadership. Implementation of such an Air Force wide policy would benefit all female military troops personally and benefit mission accomplishment globally.

Acknowledgements

The author gratefully acknowledges the support of Leslie Miller, M.D. and her ongoing research and advocacy of period suppression. The author also appreciates the encouragement and support of Marie-Annette Brown, Ph.D., ARNP, FAAN.

References

- Battista, R. M. & Creedon, J. F. (1999). Knowledge and Use of Birth Control Methods in Active Duty Army Enlisted Medical Trainees. *Military Medicine*. 164(6), 407-409.
- Berenson, A. B., Radecki, C. M., Grady, J. J., Rickert, V. I. & Thomas, A. (2001). A prospective, controlled study of the effects of hormonal contraception on bone mineral density. *Obstetrics and Gynecology*. 98(4), 576-82.
- Burkman, R. T., Collins, J. A., Shulman, L. P. & Williams, J. K. (2001). Current perspectives on oral contraceptive use. *American Journal of Obstetrics and Gynecology*. 185(Suppl), S4-12.
- Cancer and Steroid Hormone Study of the Centers for Disease Control and the National Institute of Child Health and Human Development. (1987). Combination oral contraceptive use and the risk of endometrial cancer. *The Journal of the American Medical Association*. 257(6), 796-800.
- Christensen, J. T., Boldsen, J. L. & Westergaard, J. G. (2002). Functional ovarian cysts in premenopausal and gynecologically healthy women. *Contraception*. 66(3), 153-157.
- Clark, J. B. & Holt, V. L. (1998). Unintended Pregnancy among Female Soldiers Presenting for Prenatal Care at Madigan Army Medical Center. *Military Medicine*. 163(7), 444-448.
- Côté, I., Jacobs, P. & Cumming, D. C. (2003). Use of health services associated with increased menstrual loss in the United States. *American Journal of Obstetrics and Gynecology*. 188(2), 343-348.
- Cromer, B. A. (1999). Recent clinical issues related to the use of depot medroxyprogesterone acetate (Depo-Provera). *Current Opinion in Obstetrics and Gynecology*. 11(5), 467-471.
- Cundy, T., Ames, R., Horne, A., Clearwater, J., Roberts, H., Gamble, G. & Reid, I. R. (2003). A Randomized Controlled Trial of Estrogen Replacement Therapy in Long-Term Users of Depot Medroxyprogesterone Acetate. *Journal of Clinical Endocrinology and Metabolism*. 88(1), 78-81.
- Cundy, T., Cornish, J., Roberts, H., Elder, H. & Reid, I. R. (1998). Spinal bone density in women using depot medroxyprogesterone contraception. *Obstetrics and Gynecology*. 92(4), 569-573.
- Farley, T. M., Collins, J. & Schlesselman, J. J. (1998). Hormonal contraception and risk of cardiovascular disease. An international perspective. *Contraception*. 57(3), 211-30.
- Fernandez, E., La Vecchia, C., Franceschi, S., Braga, C., Talamini, R., Negri, E. & Parazzini, F. (1998). Oral contraceptive use and risk of colorectal cancer. *Epidemiology*. 9(3), 295-300.

- Franks, A. L., Beral, V., Cates, W. & Hogue, C. J. (1990). Contraception and ectopic pregnancy risk. *American Journal of Obstetrics and Gynecology*. 163(4 Pt 1), 1120-1123.
- Friedl, K. E. & Nuovo, J. A. (1992). Factors Associated with Stress Fracture in Young Army Women: Indications for Further Research. *Military Medicine*. 157(7), 334-338.
- Hanna, J. H. (1992). An Analysis of Gynecological Problems Presenting to an Evacuation Hospital during Operation Desert Storm. *Military Medicine*. 157(5), 222-224.
- Hatcher, R. A., Trussell, J., Stewart, F., Cates, W., Stewart, G. K., Guest, F. & Kowal, D. (1998). *Contraceptive Technology*. (17th Ed.) Ardent Media., Inc.
- Henshaw, S. K. (1998). Unintended pregnancy in the United States. *Family Planning Perspective*. 30(1), 24-29.
- Hines, J. F. (1992). Ambulatory Health Care Needs of Women Deployed with a Heavy Armor Division during the Persian Gulf War. *Military Medicine*. 157(5), 219-221.
- Hobart, J. A. & Smucker, D. R. (2000). The Female Athlete Triad. *American Family Physician*. 61(11), 3357-3364.
- Hughes, T. C. & Staren-Doby, D. (2003). Reducing Unintended Pregnancy in Young, Single Active Duty Women in an Overseas Environment. *Military Medicine*. 168(1), 11-14.
- Inman, W. H., Vessey, M. P., Westerholm, B. & Englund, A. (1970). Thromboembolic disease and the steroidal content of oral contraceptives: a report to the Committee on Safety of Drugs. *British Medical Journal*. 2,203-209.
- Kaunitz, A. M. (2000). Menstruation: choosing whether ... and when. *Contraception*. 62(6), 277-284.
- Jensen, J. T. & Speroff, L. (2000). Health benefits of oral contraceptives. *Obstetrics and Gynecology Clinics of North America*. 27(4), 705-721.
- Larsson, G., Milsom, I., Lindstedt, G. & Rybo, G. (1992). The influence of a low-dose combined oral contraceptive on menstrual blood loss and iron status. *Contraception*. 46(4), 327-334.
- La Vecchia, C., Tavani, A., Franceschi, S. & Parazzini, F. (1996). Oral contraceptives and cancer. A review of the evidence. *Drug Safety*. 14(4), 260-72.
- Lointier, P., Wildrick, D. M. & Boman, B. M. (1992). The effects of steroid hormones on a human colon cancer cell line in vitro. *Anticancer Research*. 12(4), 1327-1330.

- Loudon, N. B., Foxwell, M., Potts, D. M., Guild, A. L. & Short R. V. (1977). Acceptability of an oral contraceptive that reduces the frequency of menstruation: the tri-cycle pill regimen. *British Medical Journal*. 2, 487-490.
- Miller, L. & Hughes, J. P. (2003). Continuous Combination Oral Contraceptive Pills to Eliminate Withdrawal Bleeding: A Randomized Trial. *American College of Obstetricians and Gynecologists*. 101(4), 653-661.
- Miller, L. & Notter, K. M. (2001). Menstrual Reduction With Extended Use of Combination Oral Contraceptive Pills: Randomized Controlled Trial. *Obstetrics & Gynecology*. 98(5), 771-778.
- Ott, M. O., Scholes, D., Lacroix, A. Z., Ichikawa, L. E., Yoshida, C. K. & Barlow, W. E. (2001). Effects of Contraceptive Use on Bone Biochemical Markers in Young Women. *Journal of Clinical Endocrinology and Metabolism*. 86(1), 179-185.
- Powell-Dunford, N. C., Deuster, P. A. Claybaugh, J. R. & Chapin, M. G. (2003). Attitudes and Knowledge about Continuous Oral Contraceptive Pill Use in Military Women. *Military Medicine*. 168(11), 922-928.
- Redmond, G. P., Olson, W. H., Lippman, J. S., Kafrissen, M. E., Jones, T. M. & Jorizzo, J. L. (1997). Norgestimate and ethinyl estradiol in the treatment of acne vulgaris: a randomized, placebo-controlled trial. *Obstetrics and Gynecology*. 89(4), 615-22.
- Ritchie, E. C. (2001). Issues for Military Women in Deployment: An Overview. *Military Medicine*. 166(12), 1033-1037.
- Robbins, A. S. (2002). Costs of Excess Body Weight among Active Duty Personnel, U.S. Air Force, 1997. *Military Medicine*. 167(5), 393-397.
- Rosenberg, L., Palmer, J. R., Rao, R. S. & Shapiro, S. (2001). Low-dose oral contraceptive use and the risk of myocardial infarction. *Archives of Internal Medicine*. 161(8), 1065-70.
- Schneider, M. B. , Fisher, M., Friedman, S. B., Bijur, P. E. & Toffler, P. A. (1999) Menstrual and Premenstrual Issues in Female Military Cadets: A Unique Population With Significant Concerns. *Journal of Pediatric & Adolescent Gynecology*. 12(4), 195-201.
- Vessey, M., Metcalfe, A., Wells, C., McPherson, K., Westhoff, C. & Yeates, D. (1987). Ovarian neoplasms, functional ovarian cysts, and oral contraceptives. *British Medical Journal*. 294(6586), 1518-1520.
- Wardell, D. W. & Czerwinski, B. (2001). A Military Challenge to Managing Feminine and Personal Hygiene. *Journal of the American Academy of Nurse Practitioners*. 13(4), 187-193.

- Williams, J. K. (2002). Contraceptive needs of the perimenopausal woman. *Obstetrics and Gynecology Clinics*. 29(3), 575-588.
- Winfield, A., C. & Moore, J. (1997). Risk Factors Associated with Stress Reactions in Female Marines. *Military Medicine*. 162(10), 698-702.
- World Health Organization Collaborative Study of Cardiovascular Disease and Steroid Hormone Contraception. (1995). Venous thromboembolic disease and combined oral contraceptives: results of international multicentre case-control study. *Lancet*. 346(8970), 1575-1582.
- World Health Organization Collaborative Study of Cardiovascular Disease and Steroid Hormone Contraception. (1996). Ischaemic stroke and combined oral contraceptives. Haemorrhagic stroke and overall stroke risk and combined oral contraceptives: results of an international, multicentre, case-control study. *Lancet*. 348(9026), 498-510.
- World Health Organization Collaborative Study of Cardiovascular Disease and Steroid Hormone Contraception. (1997). Acute myocardial infarction and combined oral contraceptives: results of an international multicentre case-control study. *Lancet*. 349(9060), 1202-1209.
- World Health Organization Scientific Group on Cardiovascular Disease and Steroid Hormone Contraception. (1998). Cardiovascular disease and steroid hormone contraception: report of a WHO Scientific Group. *WHO Technical Report*. Series No. 877.